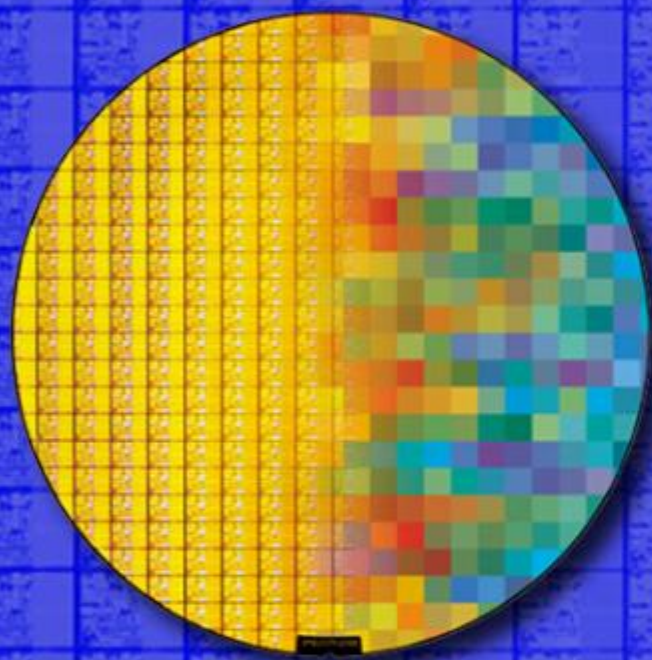
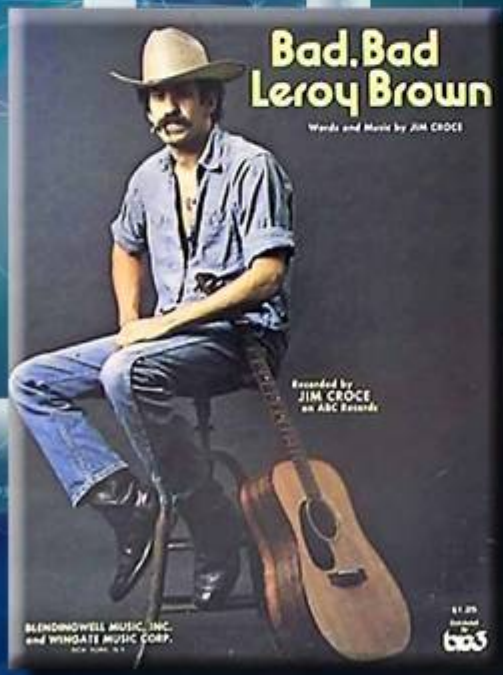


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The **NEW** Net

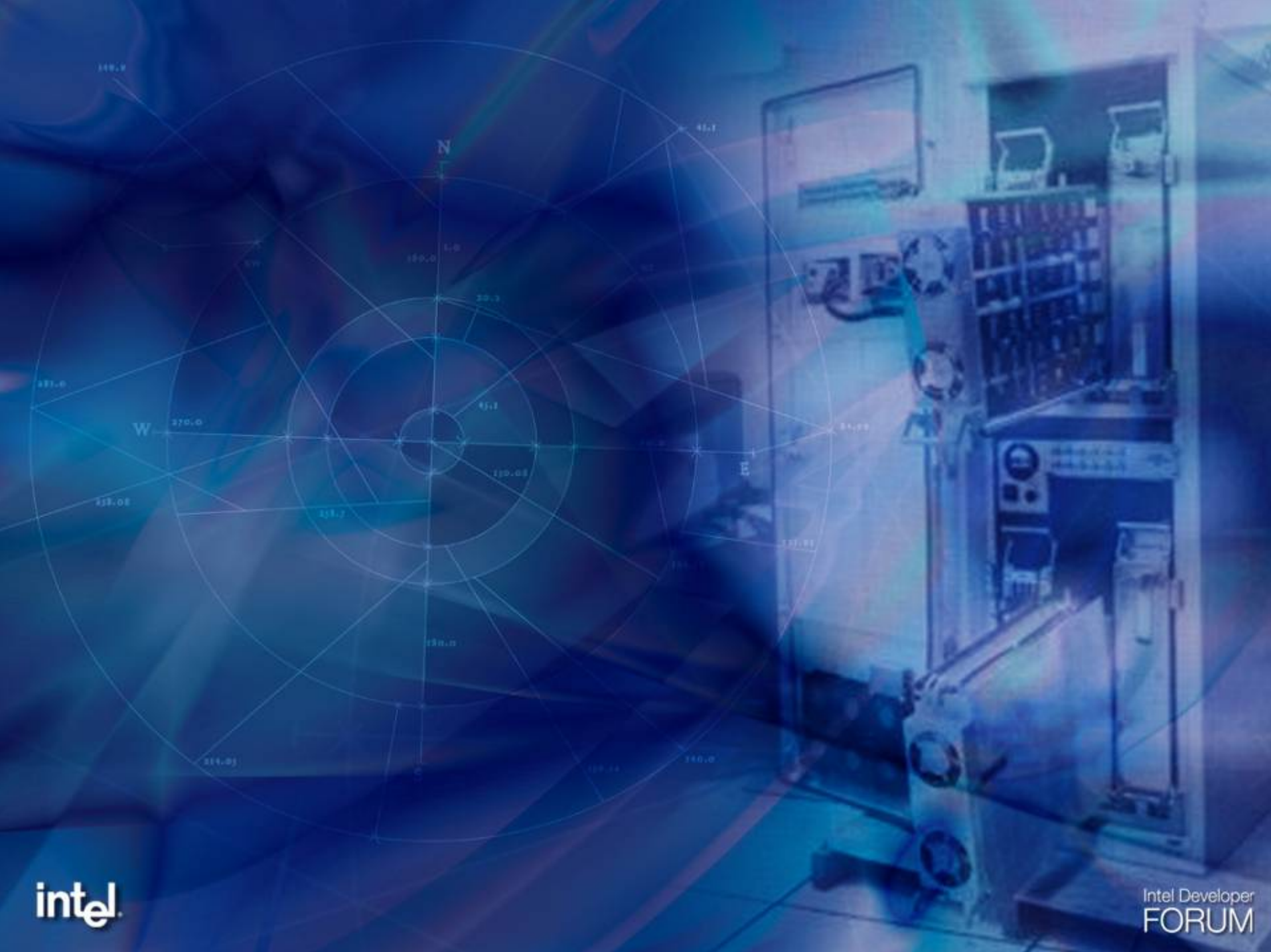
Pat Gelsinger
Chief Technology Officer



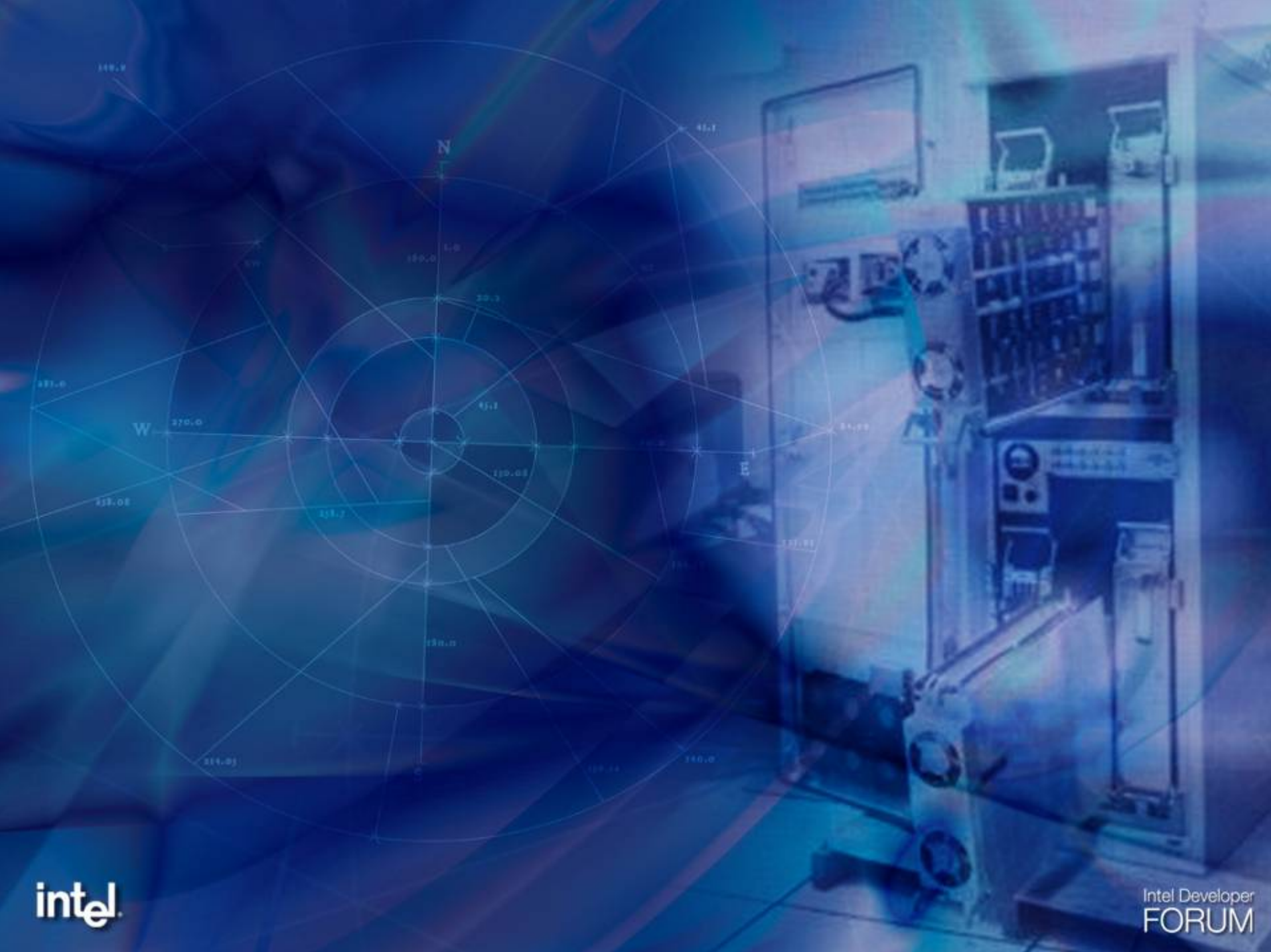


Vinton Cerf

Senior VP & Chief Strategist
MCI Worldcom









CHALLENGES

Capacity



Addressability

Bandwidth

Transient Peak Loads

**Variable Quality
Of Service**

Reliability



24x7

Points of Failure

Inconsistent

Unpredictable

Costly

Security



Vulnerability
More People
More Points

New Threats

Enforceability

Accessibility



Connectivity

Economics

Geography

Regulatory



Privacy

Taxation

National Security



The **limitations**
are **architectural**



IEEE TRANSACTIONS ON COMMUNICATIONS

MAY 1974

VOLUME COM-22

NUMBER 5

A PUBLICATION OF THE IEEE COMMUNICATIONS SOCIETY

PAPERS

Communications System Survivability Analysis

Communication Theory: Distortion in SSB-A Hybrid Coding of PL Adaptive Maximum-Likelihood

Data Communications: A Protocol for Packet Simulation Results for

Radio Communications: Intersymbol Interference Baseband Diversity for Order Wire Transmission

Wire Communications: The Range Extender with

CONCISE PAPERS

Communications Systems: Telemedicine: New Applications Random-Access Digital Communications

Communication Theory: A Unified Representation of Some Results for the Transient Response of

Part I.....M. Fount
Part II.....H. Fount

Short Transform Processing.....J. T. Ponglet
Adaptive Systems.....G. Ungerboeck

.....V. G. Cere and R. E. Kaba
Multiplicative and Additive Gaussian Noise.....J. H. Painter and L. R. Wilson

.....R. A. Ewens
.....K. Pecher, R. Y. Goulet, and S. Mortensen
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.....S. H. Lin

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.....Obituary: N. Suzuki, K. Ohi, and H. Hirakawa

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.....Reviewed by H. C. Andrews

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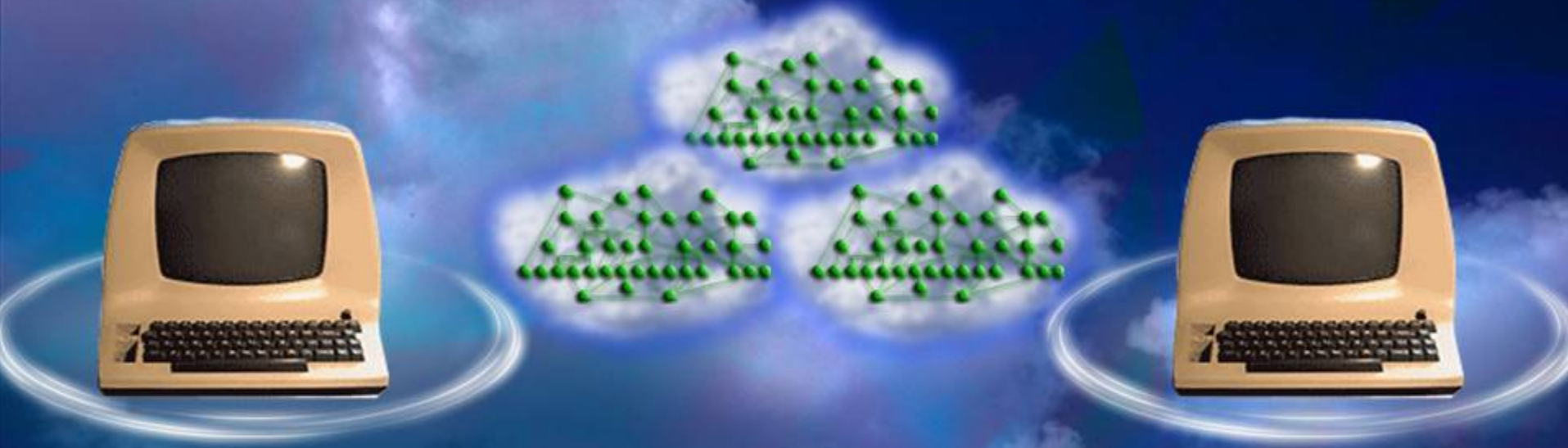
Today's Internet is like a 1973 Buick refitted with air bags and emissions controls. Its decades-old infrastructure has been rigged out with the Web and all it enables (like e-commerce), plus streaming media, peer-to-peer file sharing and videoconferencing; but it's still a 1973 Buick.

Technology Review magazine, September 2003

The Internet has reached a plateau in terms of what it can do. The right thing to do is to start over at another level.

Larry Peterson
Chair of Computer Sciences
Princeton University

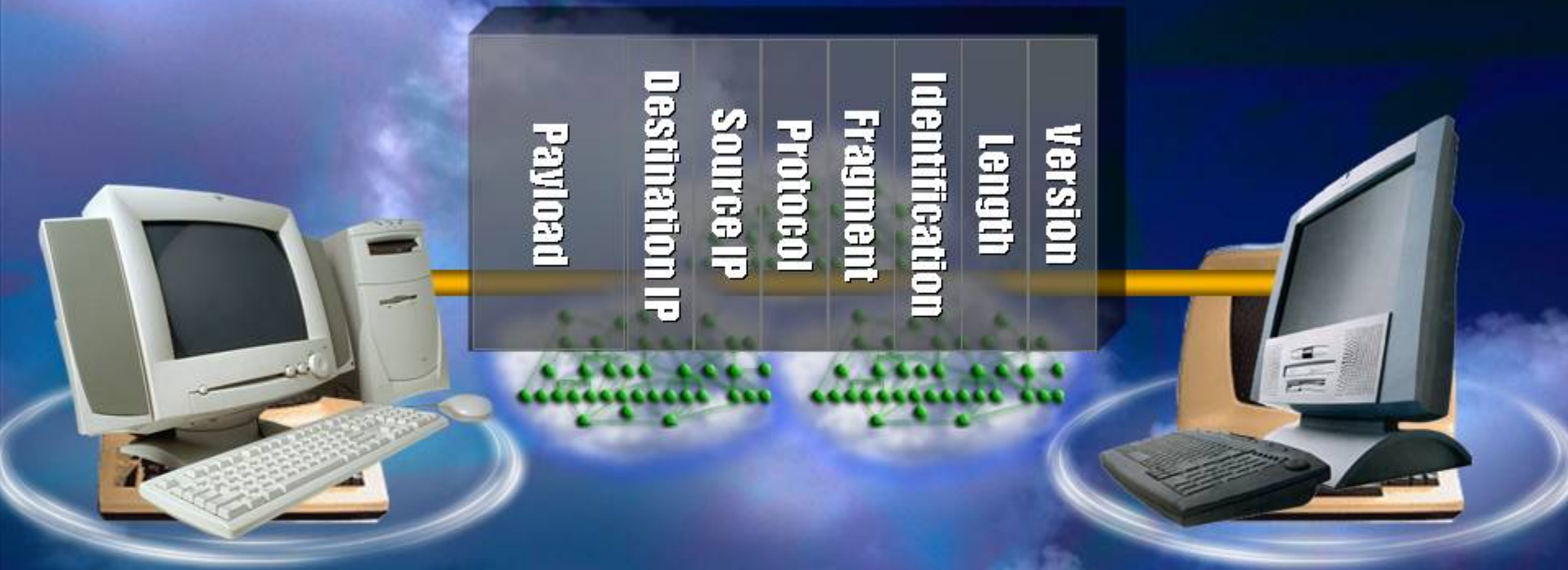
Pre-Internet



Multiple heterogeneous networks

Communication across multiple networks was impossible
Multiple protocols, multiple data formats, ports/channels

Internet – TCP/IP



IP hides all details in underlying heterogeneous networks

Providing end-to-end transparency

The Internet Today



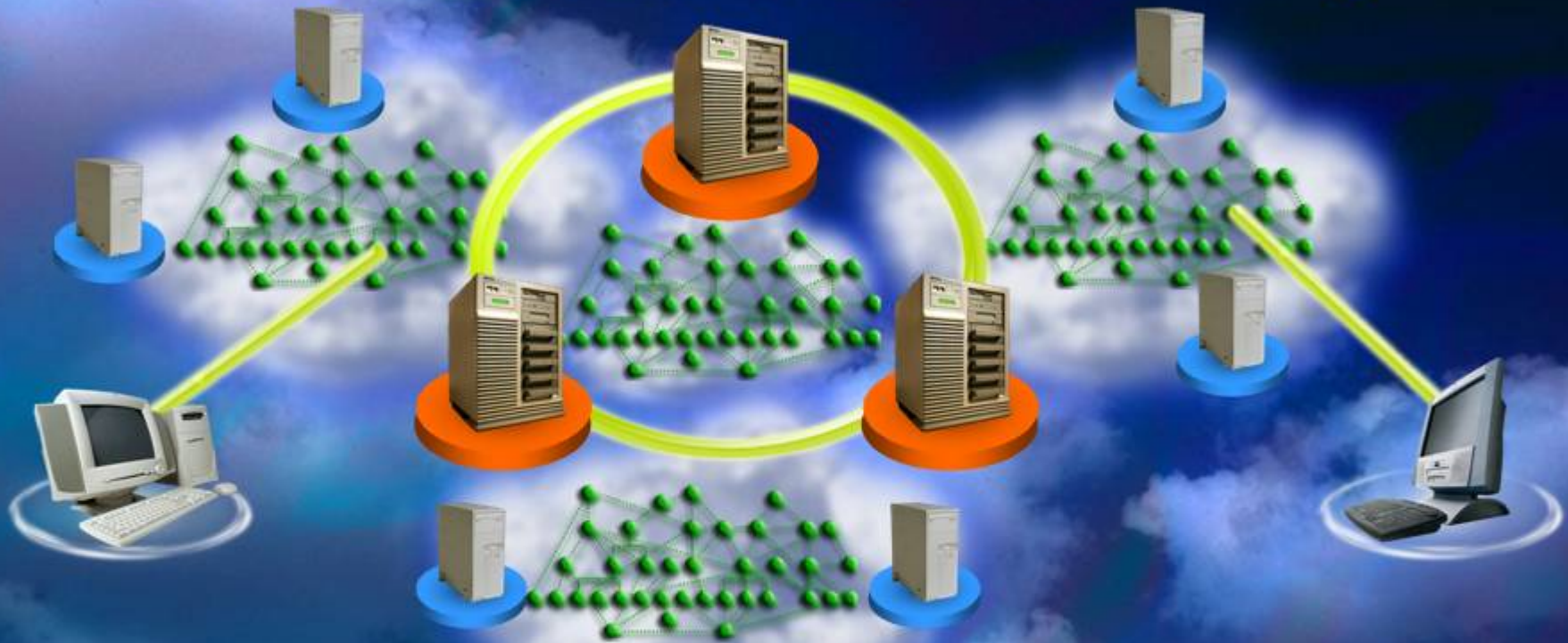
Complexity of physical network has exploded

Greater inconsistency in performance and reliability



The **solution**
is a network **overlay**

Computational Services Overlay



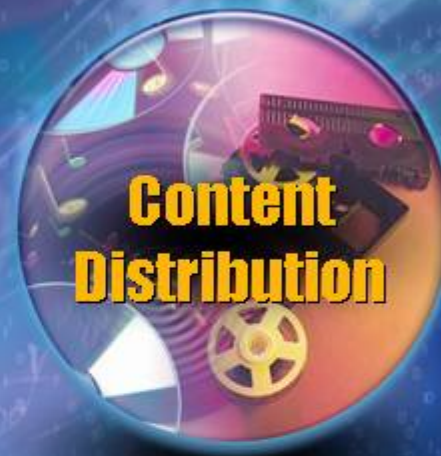
Platform for new services

Infrastructure services

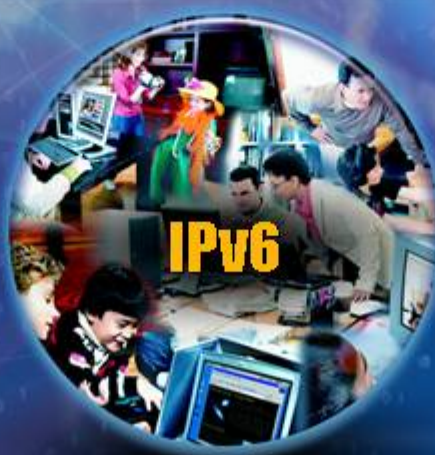
End-user services

Network-aware, adaptive

Today's Net Enhancements



Computational Services Overlay



Challenges

Capacity



Reliability



Security



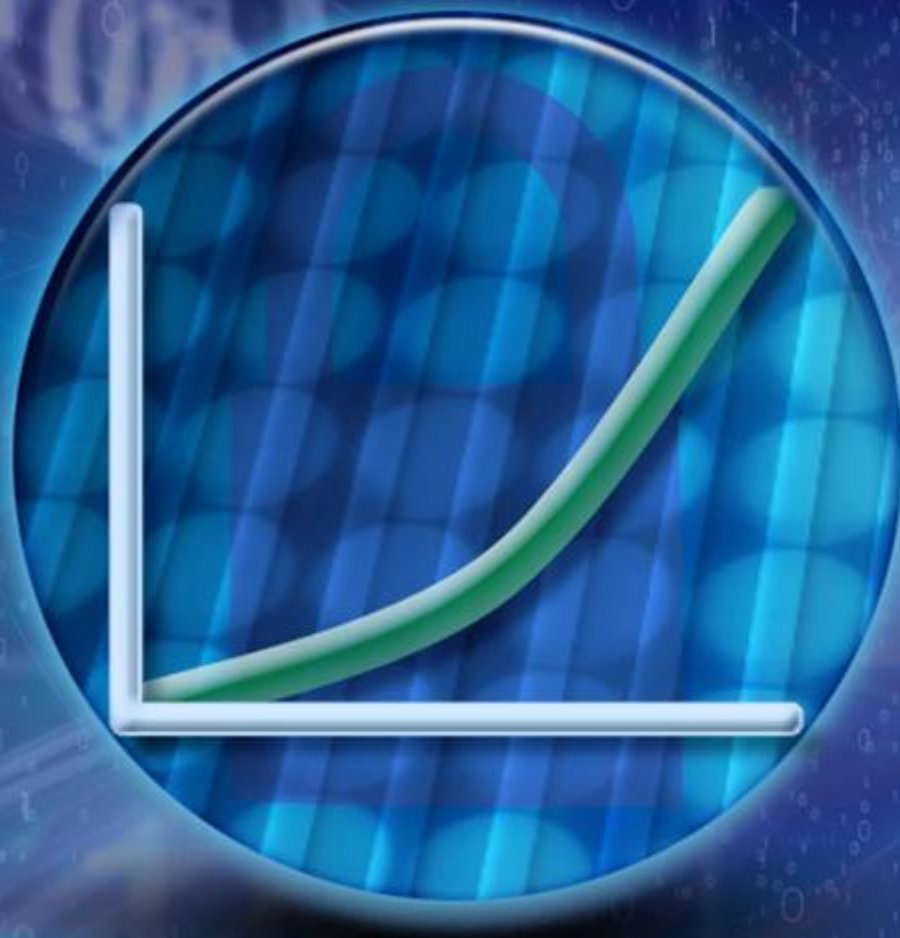
Accessibility



Regulatory



Capacity



IPv6

**Adaptive traffic
monitoring**

**Instantaneous
response to demand**

Reliability



24x7

Self diagnose

Self heal

Self routing

Security

**Secure and
trusted platforms**

IPSec

Early warning systems

**Effective response to
large-scale attacks**

Accessibility



**Delay-tolerant
computing**

Transcoding

Transrating

Regulatory



Visibility

Flexibility

Location aware



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www.planet-lab.org

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PlanetLab 2002

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7 Countries

PlanetLab 2004

440 Machines

194 Sites

22 Countries

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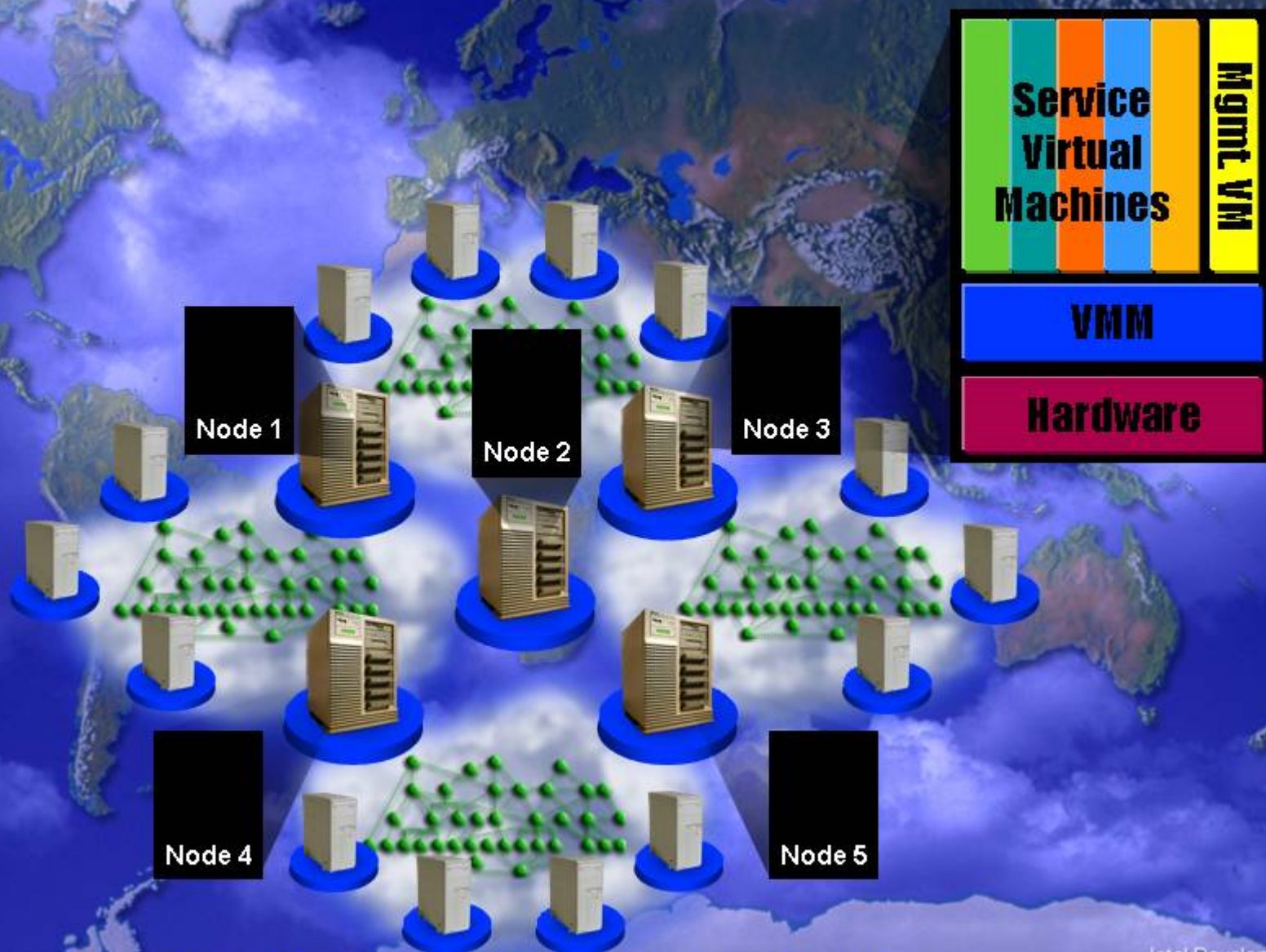
RNP

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PlanetLab Service Architecture



PlanetLab Services are Running

Infrastructure Services & End-user Services

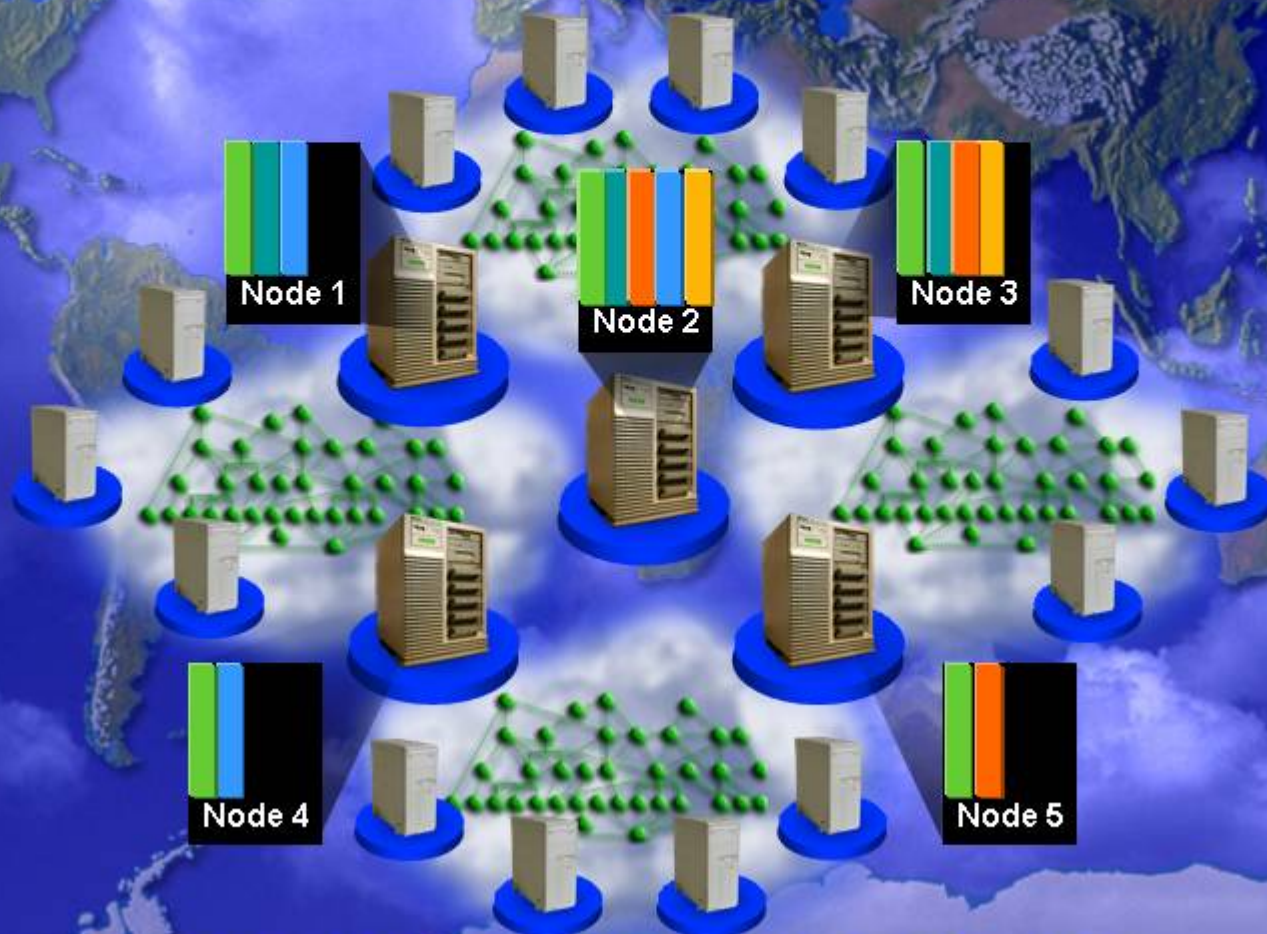
Event
Processing

Network
Mapping

Distributed
Hash Tables

Content
Distribution

Web Casting

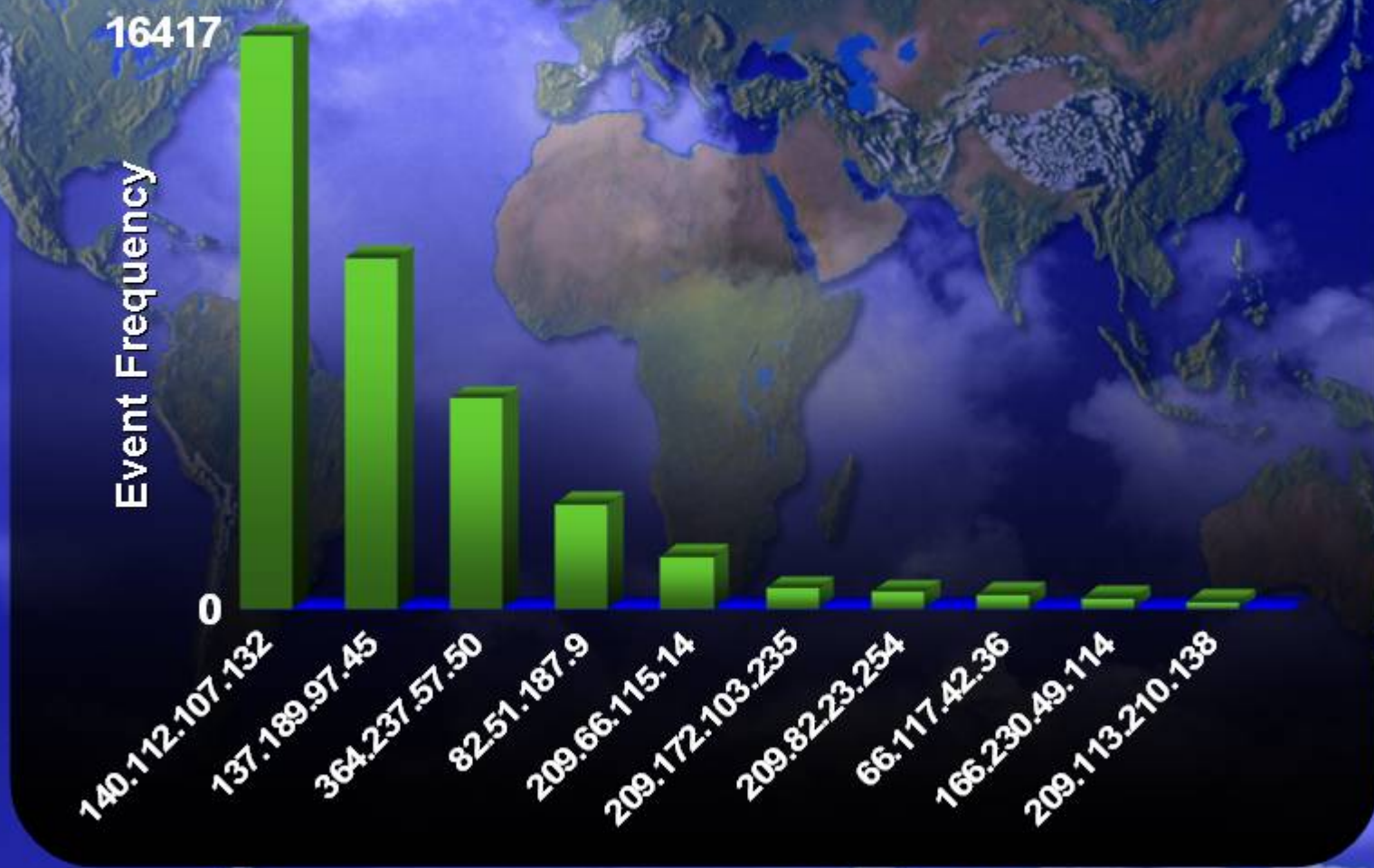


PHI @ Intel Research Berkeley

University of California
Berkeley
Haas School of Business



Top 10 Attackers

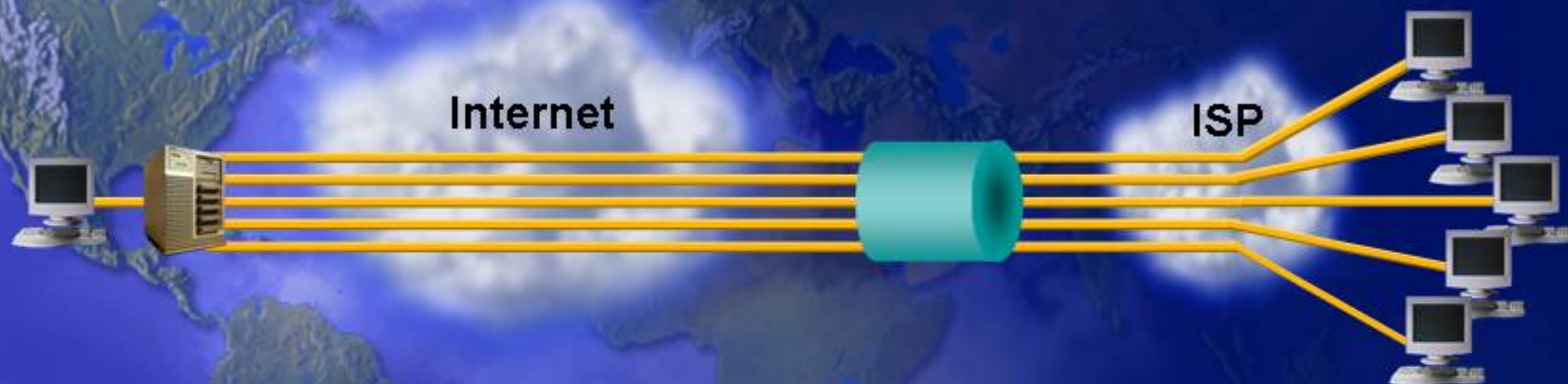


End System Multicast from CMU

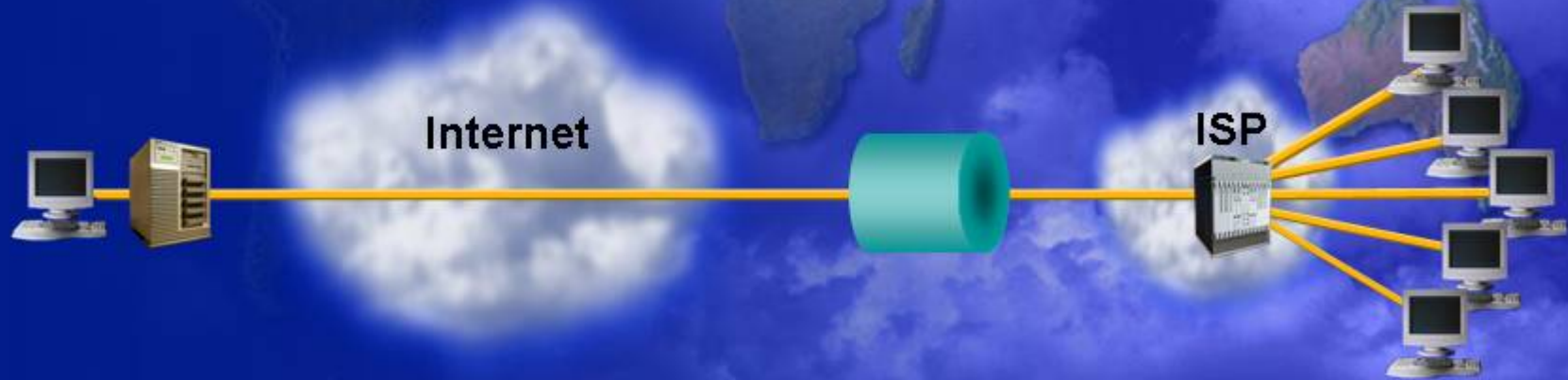
Carnegie Mellon



Dynamic Services in the Network



Dynamic Services in the Network





Researchers create Net “overlays”
to test new technologies

internetnews.com

June 24, 2003
PlanetLab 'Slices' Into Alternate Internet
Universe
By [Michael Singer](#)

COMPUTERWORLD An IDG
company

PlanetLab builds testbed for new Internet
services

Goal is 1,000 nodes piggybacked on the Internet

By Peter Sayer, IDG News Service
JUNE 25, 2003

The  **Moscow Times.com**
New Internet Applications in the Making



Internet gets its own test network

‘PlanetLab’ aims to lower cost, risk of rolling out new services

POWERED BY
indiatimes
Researchers building
Internet test-bed 

THE WALL STREET JOURNAL

Intel, HP Help Academia Set Up Web Test Network

By Don Clark

BusinessWeek online

Intel, universities create world network

A host of academic and industrial heavyweights band together to take
the lag out of getting data from halfway around the globe.



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“As more and more processes shift from analog to digital and are dependent on being available anytime, anywhere, the importance of the Internet’s resiliency can’t be underscored enough. PlanetLab provides Intel, HP and our partners and customers with an environment for testing the next generation of distributed applications and services, and after 18 months of successful scientific trials we are confident that we now can begin deploying and testing revolutionary, planetary-scale commercial services that will change the way business is done on the Internet.”



Shane Robison
Executive Vice President
Chief Technology Officer
Hewlett Packard



“PBS has already been working with Intel on the design of ACE, an integrated digital system for automating and monitoring the broadcast operations of participating PBS member stations using Hewlett Packard computer systems. PlanetLab gives us the opportunity to take our collaboration further by providing a way of testing and developing system-wide applications like HDTV content distribution.”



André Mendes
Chief Technology Integration Officer
Public Broadcasting Service



Our Vision for the New Net

Packet Communication → Service Hosting Platform

Routers → Routers/Servers/Disks

End-to-end → Edge → Everywhere

Your Role

Join PlanetLab

Participate in the internet transformation

The **NEW** Net